AMENDMENT TO THE CLAIMS OF THE APPLICATION

Please amend the claims as follows:

1 (currently amended). An integrated circuit device comprising:

a plurality of wafers arranged in a stack, said plurality of wafers including an initial wafer located at one end of said stack of wafers and a final wafer located at an opposite end of said stack of wafers, each said WAFER ~~a wafer~~ having a first surface, a second surface opposite said first surface and an optical transmission interface extending from said first ~~wafer~~ surface through to said second ~~wafer~~ surface of the wafer;~~,~~ and

a semiconductor layer disposed on said first ~~wafer~~ surface;

a plurality of integrated circuits formed on said semiconductor layer;

an optical data bus extending in a straight line through said optical transmission interface of each of said wafers in said stack of wafers normal to said first wafer surface, said optical data bus having first and second ends and being greater in length ~~that~~ than the length of said stack ~~distance between the top of said semiconductor layer and said second surface, said optical data bus extending beyond both said semiconductor layer and said second surface~~ with said first and second ends being positioned spaced respectively from said semiconductor layer of said initial wafer and from said second surface of said final wafer;

at least one device optically coupled to said optical data bus, said at least one device being external to and spaced from said stack of wafers ~~wafer~~; and

a node formed on said semiconductor layer in each wafer of said plurality of wafers, said node being adjacent to said optical transmission interface and a side of said optical data bus, said node having means for optically coupling said plurality of

integrated circuits ~~and~~ of a respective wafer with said optical data bus through said side of said optical data bus ~~for providing~~ without being physically attached thereto to provide optical data communication between said wafers and ~~with~~ said at least one device and permit, when desired, axial withdrawal of said optical data bus from said optical transmission interface in each wafer of said stack of wafers to permit detachment of selected wafers from said stack of wafers .

2 (currently amended). An integrated circuit device as recited in claim 1, wherein said optical data bus includes a plurality of couplers longitudinally spaced apart along said optical data bus, each of said couplers for translating incident optical energy propagating thereto in a direction normal to said optical data bus to optical energy propagating in opposite directions along the axis of said optical data bus and for translating the direction of propagation of a portion of incident optical energy propagating along said axis of said optical data bus to optical energy propagating in a direction normal to said axis and out said side of said optical data bus;

said plurality of couplers being equal in number to the sum of the number of said plurality of wafers and said external devices;

each ~~one of said~~ node in said plurality of wafers ~~plurality of couplers~~ being positioned in alignment with ~~said node on~~ a respective one of said plurality of couplers; and

at least one other of said plurality of couplers being optically coupled to said at least one device.

3 (previously presented). An integrated circuit device as recited in claim 2, wherein each of said couplers comprise a Bragg diffraction grating.

4 (previously presented). An integrated circuit device as recited in claim 2, wherein said at least one device comprises a plurality of devices, each of said devices being spaced from one another along said optical data bus, and wherein each of said plurality of said couplers of said optical data bus are positioned adjacent a respective one of said plurality of devices.

5 (previously presented). An integrated circuit device as recited in claim 2, wherein said optical data bus comprises a slab of light transmissive dielectric material, said slab having a straight elongate geometry.

6 (previously presented). An integrated circuit device as recited in claim 1, wherein said means for optically coupling comprises:

a transmitter having a light source for emitting a beam of light and an external modulator, wherein said light source is disposed adjacent to said external modulator and said external modulator is disposed proximate to said optical transmission interface such that said beam of light transmits said external modulator and propagates in a direction parallel to said first wafer surface and normal to said optical data bus; and

a receiver having a detector, an amplifier and signal processing circuitry, said detector disposed adjacent, said optical transmission interface facing said light source and said optical data bus, wherein said detector detects an optical signal emitted from

said optical data bus in a direction normal thereto, and converts said signal to an electrical signal that is amplified by said amplifier.

7 (previously presented). An integrated circuit device as recited in claim 6, wherein said light source is a hybrid element integral with said semiconductor layer.

8 (currently amended). An integrated circuit device as recited in claim 6, wherein said light source is ~~regrowth~~ epitaxial growth semiconductor material on silicon.

Claims 9 and 10 (canceled).

11(previously presented). An integrated circuit device as recited in claim 6, wherein said light beam is a coherent monochromatic beam of light.

12 (previously presented). An integrated circuit device as recited in claim 6, wherein said external modulator is an electro absorption modulator.

13 (previously presented). An integrated circuit device as recited in claim 6, wherein said external modulator is a semiconductor laser diode modulator.

14 (previously presented). An integrated circuit device as recited in claim 13, wherein said semiconductor laser diode modulator has a discrete channel spectrum of from 1300 nanometers (nm) to 1600 nanometers (nm).

15 (previously presented). An integrated circuit device as recited in claim 6, wherein said external modulator is integral with said semiconductor layer.

16 (previously presented). An integrated circuit device as recited in claim 6, wherein said external modulator is formed of a semiconductor material selected from the group consisting of gallium arsenide (GaAs), gallium phosphide (GaP), indium phosphide (InP), and indium arsenide (InAs).

17 (currently amended). An integrated circuit device as recited in claim 6, wherein said external modulator is formed of a millimeter wave integrated circuit material selected from the group consisting of indium, gallium, aluminum, gallium arsenide, and indium phosphide.

18 (currently amended) . An integrated circuit device as recited in claim 17, wherein said millimeter wave integrated circuit material is compatible with a semiconductor material selected from the group consisting of gallium ~~aresenide~~ arsenide (GaAs), gallium phosphide (GaP), indium phosphide (InP), and indium ~~aresenide~~ arsenide (InAs).

19 (currently amended). An integrated circuit device comprising:

a plurality of wafers ~~adjacently stacked~~, each wafer having a first surface, a second surface opposite said first surface and an optical transmission interface extending from said first wafer surface through to said second wafer surface, a semiconductor layer disposed on each said first wafer surface, and a plurality of

integrated circuits formed on each said semiconductor layer, said plurality of integrated circuits including a node formed on said semiconductor layer adjacent to said optical transmission interface, said node having means for coupling optical data into and out of said plurality of integrated circuits;

said plurality of wafers being in parallel adjacent one another and aligned to define a straight stack of wafers, with said optical transmission interface of each of said plurality of wafers being aligned to define a straight path through said stack of wafers, said plurality of wafers including an initial wafer located at one end of said stack of wafers and a final wafer located at an opposite end of said stack of wafers, the first surface of said initial wafer being oriented facing away from said stack of wafers and the first surface of said final wafer being oriented facing into said stack of wafers; and

an optical data bus extending axially through said straight path and through each said optical transmission interface in said straight path normal to each said first wafer surface at each said wafer node, said optical data bus having means for coupling optical data between one said wafer node and other wafer nodes located on said wafers within the stack without being physically attached to any of said wafer nodes,to permit said optical data bus to be axially withdrawn from said stack of wafers, when desired, enabling individual wafers to be selectively withdrawn from said stack ~~; and~~

~~means for replacing a defective wafer of said stack~~.

20 (previously presented). An integrated circuit device as recited in claim 19, wherein each said wafer is formed of a thermally conductive material.

21 (previously presented). An integrated circuit device as recited in claim 19, wherein each said wafer is formed of a material selected from the group consisting of diamond and sapphire.

22 (previously presented). An integrated circuit device as recited in claim 19, wherein each said semiconductor layer is formed of a material selected from the group consisting of silicon (Si), germanium (Ge), gallium arsenide (GaAs), gallium phosphide (GaP), indium phosphide (InP), and indium arsenide (InAs).

23 (previously presented). An integrated circuit device as recited in claim 19, wherein each said integrated circuit is an application specific integrated circuit (ASIC).

24 (previously presented). An integrated circuit device as recited in claim 19, wherein said means for coupling optical data into and out of said plurality of integrated circuits comprises:

a transmitter having a light source for emitting a beam of light and an external modulator, wherein said light source is disposed adjacent to said external modulator and said external modulator is disposed proximate to said optical transmission interface such that said beam of light transmits said external modulator and propagates in a direction parallel to said first wafer surface and normal to said optical data bus; and

a receiver having a detector, an amplifier and signal processing circuitry, said detector disposed adjacent said optical transmission interface facing said light source and said optical data bus, wherein said detector detects an optical signal emitted from

said optical data bus in a direction normal thereto, and converts said signal to an electrical signal that is amplified by said amplifier.

25 (previously presented). An integrated circuit device as recited in claim 24, wherein said light source is a hybrid element integral with said semiconductor layer.

26 (currently amended). An integrated circuit device as recited in claim 24, wherein said light source is ~~re-growth~~ epitaxial growth semiconductor material on silicon.

27 (currently amended). An integrated circuit device as recited in claim 26, wherein said ~~re-growth~~ epitaxial growth semiconductor material is a material selected from the group consisting of gallium arsenide (GaAs), gallium phosphide (GaP), indium phosphide (InP), and indium arsenide (InAs).

28 (previously presented). An integrated circuit device as recited in claim 24, wherein said light source is a porous silicon optical emitter.

29 (previously presented). An integrated circuit device as recited in claim 24, wherein said light beam is a coherent monochromatic beam of light.

30 (previously presented). An integrated circuit device as recited in claim 24, wherein said external modulator is an electro absorption modulator.

31 (previously presented). An integrated circuit device as recited in claim 24, wherein said external modulator is a semiconductor laser diode modulator.

32 (previously presented). An integrated circuit device as recited in claim 31, wherein said semiconductor laser diode modulator has a discrete channel spectrum of from 1300 nanometers (nm) to 1600 nanometers (nm).

33 (previously presented). An integrated circuit device as recited in claim 24, wherein said external modulator is integral with said semiconductor layer.

34 (previously presented). An integrated circuit device as recited in claim 24, wherein said external modulator is formed of a semiconductor material selected from the group consisting of gallium arsenide (GaAs), gallium phosphide (Gal'), indium phosphide (InP), and indium arsenide (InAs).

Claims 35 and 36 (canceled).

37 (currently amended). An integrated circuit device comprising:

a plurality of wafers arranged in a stack, said plurality of wafers including an initial wafer located at one end of said stack of wafers and a final wafer located at an opposite end of said stack of wafers, each said ~~a~~ wafer having a first surface, and a second surface opposite said first surface;

a semiconductor layer disposed on said first wafer surface;

a plurality of integrated circuits formed on said semiconductor layer;

an optical data bus extending in a straight line along an edge of said stack of wafers ~~wafer~~ normal to said first ~~wafer~~ surface of each wafer in said stack of wafers, ~~and extending beyond both said semiconductor layer and said second surface~~, said optical data bus having first and second ends and a side and being greater in length that the distance between the top of said semiconductor layer of said initial wafer and said second surface of said final wafer;

said optical data bus being physically ~~disconnected from said optical transmission interface and said wafer~~ unattached to individual wafers of said plurality of wafers;

a plurality of external devices coupled to said optical data bus; and

each wafer of said plurality of wafers including a node formed on said semiconductor layer of the respective wafer adjacent to said wafer edge and a side of said optical data bus, said node including means for optically coupling said plurality of integrated circuits and said optical data bus;

said optical data bus including a plurality of couplers longitudinally spaced apart along said optical data bus, each of said couplers for translating incident optical energy propagating thereto in a direction normal to said optical data bus to optical energy propagating in opposite directions along the axis of said optical data bus and for translating the direction of propagation of a portion of optical energy propagating along said axis of said optical data bus incident thereon to optical energy propagating in a direction normal to said axis out a side of said optical data bus;

a first portion ~~one~~ of said plurality of couplers being positioned in alignment with respective ones of said nodes ~~node~~; and

the remainder of said plurality of couplers being optically coupled to respective ones of said plurality of external devices.

38 (previously presented). An integrated circuit device as recited in claim 37, wherein said means for optically coupling comprises:

a transmitter having a light source for emitting a beam of light and an external modulator, wherein said light source is disposed adjacent to said external modulator and said external modulator is disposed proximate to said wafer edge such that said beam of light transmits said external modulator and propagates in a direction parallel to said first wafer surface and normal to said optical data bus; and

a receiver having a detector, an amplifier and signal processing circuitry, said detector disposed adjacent said wafer edge facing said light source and said optical data bus, wherein said detector detects an optical signal emitted from said optical data bus in a direction normal thereto, and converts said signal to an electrical signal that is amplified by said amplifier.

39 (currently amended). An integrated circuit device comprising:

a plurality of wafers adjacently stacked, each wafer having a first surface, a second surface opposite said first surface, a semiconductor layer disposed on each said first wafer surface, and a plurality of integrated circuits formed on each said semiconductor layer, said plurality of integrated circuits including a node formed on said semiconductor layer adjacent to an edge of said wafer, said node having means for coupling optical data into and out of said plurality of integrated circuits;

~~an~~ a straight optical data bus extending axially in a straight path through each said wafer edge normal to each said first wafer surface at each said wafer node without being attached to said wafer edge, said optical data bus having means for coupling optical data between one said wafer node and other wafer nodes located on said wafers within the stack~~; and~~

~~means for replacing a defective wafer of said stack~~.

40 (previously presented). An integrated circuit device as recited in claim 39, wherein said means for coupling optical data into and out of said plurality of integrated circuits comprises:

a transmitter having a light source for emitting a beam of light and an external modulator, wherein said light source is disposed adjacent to said external modulator and said external modulator is disposed proximate to said wafer edge such that said beam of light transmits said external modulator and propagates in a direction parallel to said first wafer surface and normal to said optical data bus; and

a receiver having a detector, an amplifier and signal processing circuitry, said detector disposed adjacent said wafer edge facing said light source and said optical data bus, wherein said detector detects an optical signal emitted from said optical data bus in a direction normal thereto, and converts said signal to an electrical signal that is amplified by said amplifier.

41 (previously presented). An integrated circuit device as recited in claim 3, wherein said at least one device comprises a plurality of devices, each of said devices being

spaced from one another along said optical data bus, and wherein each of said plurality of said couplers of said optical data bus are positioned adjacent a respective one of said plurality of devices.

42 (previously presented). An integrated circuit device as recited in claim 41, wherein said optical data bus comprises a slab of light transmissive dielectric material, said slab having a straight elongate geometry.

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